# The early diagnostic value of dimer combined with abdominal CT in patients with ischemic colitis

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Abstract: To analyze the value of intraperitoneal injection of Maikangping in the early diagnosis of ischemic colitis (IC) patients, the results of abdominal digital subtraction angiography (DSA) were used as a control. By organizing time and combining with abdominal CT detection data, the diagnostic results of abdominal CT were positive in 57 cases and negative in 43 cases. The comparison of the two types of CT data is based on sensitivity, specificity, accuracy, positive predictive value, and negative predictive value. The data detected by DSPSSCP T is significantly higher than that of non-Cp patients. In the experiment, there were 57 cases of recurrence and 43 cases of recurrence in the IC group. Using DSASPSSCT detection as a reference, there are differences compared with D DSPSCT data. Conclusion: The combined application of D and abdominal CT has good value for the early diagnosis of IC patients and is of great significance for the related treatment of the disease. It can provide good prognostic treatment assistance.

Keywords: Ischemicolitis; Dimer; Abdominal CT; Diagnostic value

## 1. Introduction

Ischemic inflammation is caused by problems such as vascular embolism and insufficient blood supply. This disease is a non-invasive disease characterized by the patient's clinical and clinical manifestations of abdominal pain, fever and blood clotting. This disease became the most common later. After the tilt treatment, they have its incidence rate all year round, and has the possibility of getting sick year after year. Ischemic bowl disease is a disease caused by various degrees of necrosis of the intestinal wall due to reduced blood flow and inadequate perfusion in the small intestine or colon.[1] It can be defined as a decrease in blood flow insufficient to maintain the metabolic function of cells of intestinal wall tissue. Clinical manifestations and signs of ischemic bowel disease are diverse and lack specificity, making early diagnosis difficult and leading to a high rate of misdiagnosis. In some severe cases, especially acute mesenteric ischemia, can develop into intestinal infarction, acute peritonitis, toxic colitis and even lead to multiple organ failure, with extremely high mortality rates. Therefore, finding a simple and convenient biological indicator is of great importance for early diagnosis of ischemic bowel disease [2].

With the improvement of the level of slicing of people, although the quality of roving was affected by various diseases, it also had a significant impact. My chemical organization is easier to communicate with the outside world, especially in patients with more potential diseases. Patients with ischemic colitis often encounter difficulties in diagnosis due to sufficient clinical manifestations. The sensitivity of early diagnosis of diseases may require special attention. Hence, integrating this approach with abdominal CT enhances the precision of diagnosing IC diseases, thereby bolstering early diagnostic efficacy. This study concentrates on investigating the precise detection capability of two CT methods in early diagnosis, assessing the diagnostic effectiveness when combining them for various IDC diseases, and elucidating their specific clinical utility.

## 2. Materials and Methods

## 2.1 General Information

Intensive care patients who were diagnosed in hospital between February 2021 and February 2023. Implement the admission criteria on the basis of the following items. First, he pre-identified patients

with pain, blood cooling and fever as the main symptoms. Through blood tests, the occult blood is positive. Secondly, patients over 18-year-old have the ability to carry out independent assessments. Article 30: If patients with liver disease and their family members are able to conduct experimental research in the form of signal perception, they enter experimental patients. Exclusion criteria: First, in addition to these diseases, hepatitis also includes cardiovascular and cerebrovascular diseases. Secondly, the patient's physical condition is good, and their kidney function is abnormal. According to the final and excluded criteria, one hundred patients were included in the IC group, including 57 cases diagnosed with IC using abdominal digital subtraction angiography (DSA) and 43 cases diagnosed with non IC. Among them were 31-males and 29-females of 27–63 years of age, with an average age of years ( $43.12 \pm 4.64$ ); Types of lesions: 25 cases of single and 32 cases of multi-segment lesions; 25 males and eighteen females in a non-surgical group; Age range from 24-years to 69 years, with average age ( $50.12 \pm 3.36$ ) years; Among them were 27cases of recurrent colitis and 13cases of infectious colitis. There was no statistically significant difference in bone density between the two groups of patients (P>0.05) and this study was supported by the medical ethics committee of four hospitals.

The observation and control groups excluded patients with a history of colorectal cancer, inflammatory disease of the bowl, family polyposis, primary dyslipidaemia, malignant tumors of other organs, as well as several primary diseases such as liver, kidneys, heart, lungs, hematopoietic system, endocrine system, etc., including a history of colorectal surgery, a family history of tumors, a history of chronic intravascular coagulation and incomplete information.

#### 2.2 Method

D-D testing: Within 24 hours of admission, the patient uses an immunoturbidimeter and a single detection kit to sample and excrete blood at D-D levels. If the D level is  $\geq 0.3$ mg/L, it is positive, while<0.3mg/L is negative. Abdominal ultrasound examination: Scan with an A644 spiral CT scanner. The results of abdominal CT plain scan examination include: ① serum exudation (or accompanied by retroperitoneal exudation), ② thickening of the gallbladder, ③ flocculent protrusions in the abdominal cavity, ④ expansion and accumulation of fluid in the abdominal cavity, ⑤ thickening of the body surface. Normal abdominal CT indicates normal blood flow. The diagnostic criteria for combining D with abdominal CT: If D is diagnosed as positive, the abdominal CT diagnosis is reconsidered as a positive combined diagnosis.

#### 2.3 Statistical Processing Data Analysis

Adopting PSS21.0. Use t-test to measure data  $(x \pm s)$  and describe the percentage (%) of the calculated data. The Kappa value reflects the diagnostic effect, with Kappa>0.6 indicating good consistency and P<0.05 indicating statistically significant differences.

#### 3. Results

#### 3.1 Twosets of abdominal CT examination results

51 cases had recurrence, and 49 cases had ineffective abdominal CT diagnosis. Using DSA detection results as a control, the sensitivity, specificity, accuracy, positive predictive value, and negative predictive value of abdominal CT diagnosis were 81.08%, 91.30%, 85.00%, 93.75%, and 76.00%, respectively, with Kappa of 0.695.

#### 3.2 D-Dtestresults of two groups of patients

The D-D level of ICgroup patients  $(1.02 \pm 0.75)$  mg/L, significantly higher than that of non ICgroup patients  $(0.31 \pm 0.06)$  mg/L; In the ICgroup, 40 cases were D positive and 17 cases were negative; 23 cases were D positive and 20 cases were energetic in the non IC group; Based on DSA examination outcomes, the sensitivity, specificity, accuracy, positive predictive value, and negative predictive value of D-D in diagnosing IC were 86.48%, 56.52%, 75.00%, 19%, and 72.22%, respectively, with a Kappa statistic of 0.448. Assessing the diagnostic efficacy of 2.3D D in combination with abdominal CT for IC, considering Figures 1 to 4, the combined sensitivity, specificity, accuracy, positive predictive value, and negative predictive value in diagnosing IC were 94.59%, 91.30%, 93.33%, 94.59%, and 91.30%, respectively, with a Kappa statistic of 0.858, using DSA examination outcomes as a control.



Figure 1: Abdominal CT

Male, 65 years old, with encephalomyelitis. CT scan showed testicular obstruction, upper mesenteric red blood cell thrombosis, D-D21.8Hmg/kg, and postoperative pathological confirmation was testicular necrosis.

## 4. Discussion

Ischemic colitis poses a significant challenge, characterizing a segmental colonic ischemia and manifesting as a clinical entity. Numerous diseases and pathological features contribute to this condition, often initiating with abdominal pain, complicating precise differentiation among ischemic, inflammatory, social, and dietary etiologies. Predominantly affecting middle-aged and elderly individuals, its nonspecific symptoms may not significantly impact daily life, leading to overlooked diagnoses, delayed treatment, and compromised therapeutic outcomes. Integrating duplex imaging and primary CT scans enhances early detection of systemic infections. Employing this CT modality aids prompt assessment, facilitating subsequent treatment decisions, meeting requisite therapeutic criteria, and elevating overall treatment standards. This diagnostic strategy enables precise identification, prompts diagnostic imagery, and offers valuable insights into patients presenting similar symptoms. The combined use of duplex imaging and abdominal CT also presents valuable insights into other abdominal organ pathologies.

When the body is normal, 10% of the cardiac output is used for the gastrointestinal tract, and the content changes after meals or during exercise. The occurrence of acute mesenteric ischemic disease is mainly influenced by factors such as vascular lesions, insufficient blood flow, and blood changes <sup>[3]</sup>. After onset, acute ischemia of all arteries or major branches of the mesentery is the main manifestation, and middle-aged and elderly people are the high-risk population for this disease. This disease has no specific clinical manifestations, and common symptoms are sudden and severe abdominal pain accompanied by severe diarrhea and vomiting, with varying degrees of rectal bleeding within 24 hours. When diagnosing diseases in clinical practice, the following methods should be combined for diagnosis, including: ① testing of laboratory indicators such as interleukin and intestinal fatty acid binding protein; ② Colonoscopy examination has a good examination effect, but it is prone to damage the patient's intestinal mucosa; ③ Imaging examination is the gold standard for diagnosing this disease, with high sensitivity and specificity; ④ Isotope examination.

D-dimer, as a fibrinolytic marker, comes from the cross-linking of fibrin monomers by activating factors and then hydrolysis. Its content is very low in healthy individuals, and under normal circumstances, its content does not change significantly. When acute vascular disease occurs in the body, its content significantly increases[4].

Ischemic acute enteritis is a disease caused by ischemia of a certain segment of the colon, with the main clinical manifestations being abdominal pain or bloody stools. For patients, there are many diseases and pathological characteristics that cause abdominal pain. Early onset of abdominal pain in patients makes it difficult to timely and accurately determine whether ischemic colitis is caused by ischemia of a certain segment of the colon. The main patients with the disease are middle-aged and elderly people. Due to the lack of sensitivity of the patient's pain nerves, simple abdominal pain may not have a certain impact on the patient's daily life, leading to the long-term lack of attention to the disease, ultimately delaying subsequent treatment and affecting the overall treatment effect <sup>[5]</sup>. The combination of dimer and abdominal CT as the main diagnostic method can further improve the early diagnosis of ischemic colitis in patients. By using this CT method, early diagnosis of the patient's disease can be made, leaving ample space for subsequent treatment. This diagnostic method has a clear judgment, prompt images, and provides positive support for determining whether the patient has ischemic colitis. The combination of dimer and abdominal cortal quality of treatment. This diagnostic method has a clear judgment, prompt images, and provides positive support for determining whether the patient has ischemic colitis. The combination of dimer and abdominal CT also provides good indications for other organ lesions in the abdominal cavity.

The concept of ischemic bowel disease was first proposed in the 1960s, mainly including ischemic colitis (IC), chronic mesenteric ischemia (CMI), and acute mesenteric ischemia (AM1). According to the severity of the patient's clinical symptoms, acute ischemic bowel disease can be divided into two categories: acute ischemic bowel disease and chronic ischemic bowel disease. Acute ischemic bowel disease is mainly manifested in acute ischemia of all arteries (located on the mesentery) or major branches. This disease occurs mostly in middle-aged and elderly people, and is often accompanied by hypertension, arteriosclerosis, diabetes, cardiac insufficiency, hyperlipidemia, coronary atherosclerosis, and other diseases<sup>[5]</sup>. Under normal circumstances, the blood flow of the gastrointestinal tract accounts for about 10% of cardiac output. There is a certain degree of change in blood flow after exercise or dining. Acute intestinal ischemia is mainly caused by factors such as vascular disease, insufficient blood flow, blood changes, and intestinal lesions.

The concept of ischemic bowel disease was first proposed in the 1960s and can be divided into ischemic colitis (IC), acute mesenteric ischemia (AMI), and chronic mesenteric ischemia (CMI), with ischemic colitis being the most common. This disease can occur in any part of the small intestine and colon, with acute mesenteric ischemia more common in the small intestine and ischemic colitis mainly characterized by colon ischemia. This disease is more common in the left colon, especially in the splenic flexure, descending colon, and sigmoid colon.

There are many risk factors for ischemic bowel disease, including diabetes, hypertension, abnormal lipid metabolism, history of cardiovascular and cerebrovascular diseases, long-term use of related drugs (cardiotonic drugs, hormones, etc.). Ischemic bowel disease can occur in various age groups, but it is more common in middle-aged and elderly people over 50 years old. Patients are usually accompanied by related basic diseases, especially those with vascular risk factors, including diabetes, cardiovascular and cerebrovascular diseases.

The main mechanisms leading to the onset of ischemic bowel disease include non-obstructive ischemia, thrombotic arterial occlusion, and mesenteric venous thrombosis. Nonvascular obstructive ischemia caused by insufficient perfusion of mesenteric microvasculature is the most common mechanism of ischemic colitis, and this type of ischemia is usually most prominent at the junction of splenic flexure and rectum sigmoid colon. Due to the dual supply of blood from the visceral and systemic arterial systems, rectal ischemia is not common. The main cause of thrombotic arterial occlusion is atherosclerosis, which is often accompanied by basic cardiovascular diseases, including coronary heart disease, atrial fibrillation, and cardiac membrane disease. The formation of mesenteric vein thrombosis originates from mesenteric vein obstruction and secondary arterial spasm, ultimately leading to insufficient intestinal blood flow perfusion.

The clinical manifestations of ischemic bowel disease are diverse, mainly characterized by abdominal pain and bloody stools, with relief of abdominal pain after defecation, often accompanied by symptoms such as diarrhea, nausea, and vomiting. Widespread differential diagnosis, non-specific symptoms of multiple coexisting diseases, and difficulty in determining the causes of ischemic bowel disease increase the difficulty of diagnosis, which can easily lead to missed diagnosis and misdiagnosis. Due to the lack of specificity in clinical symptoms and unclear early abdominal signs, early correct and timely diagnosis, and treatment play an important role in the prognosis of patients with ischemic bowel disease.

Most existing diagnostic methods for ischemic bowel disease lack specificity and sensitivity. At

present, colonoscopy has been widely used in the diagnosis of ischemic bowel disease. It not only allows for intuitive observation of lesions, but also enables biopsy of suspicious intestinal lesions to distinguish them from other diseases. Although there are many examination methods in clinical practice, there are also shortcomings such as high cost, complex technology, and time-consuming operation. Therefore, it is still necessary to explore simple and inexpensive examination methods in clinical practice<sup>[5]</sup>.

At present, the detection of plasma D-dimer has gradually been applied in the diagnosis of clinical diseases and has achieved certain results. D-dimer is a degradation product of fibrin, which is produced by crosslinking fibrin monomers with activating factors and then hydrolyzing them. It is currently a highly sensitive early biomarker, but with low specificity. Research has shown that D-dimer typically increases during arterial or venous occlusion, while remaining within the normal range during non-obstructive acute intestinal ischemia. A recent meta-analysis showed that the area under the ROC curve (AUC) of D-dimer is 0.81, which has potential clinical application value.

Although the clinical symptoms and signs of acute ischemic bowel disease are non-specific, they still have their own characteristics that can aid in clinical diagnosis. The most common clinical manifestations are sudden and severe abdominal pain, accompanied by severe diarrhea and vomiting; Patients often tend to defecate and may experience bloody stools within 24 hours. Depending on the amount of bleeding, this can manifest as positive fecal occult blood, black stools, bright red or dark red stools. Sudden severe abdominal pain, strong gastrointestinal emptying, and organic heart disease can be common symptoms of acute ischemic bowel disease<sup>[5]</sup>.

The clinical diagnostic methods for ischemic bowel disease mainly include the following four aspects: (1) laboratory diagnosis, mainly including determination of intestinal fatty acid binding protein (I-FABP), plasma D-dimer, interleukin (IL), and D-lactate levels; (2) Colonoscopy examination, which is beneficial for determining the location and progression of the disease, but can easily cause acute damage to the intestinal mucosa; (3) Imaging diagnosis, mainly including ultrasound examination, CT angiography, and selective abdominal artery angiography, has been reported to have extremely high sensitivity and specificity in literature, and is known as the "gold standard" for the diagnosis of ischemic bowel disease; (4) Isotope testing is an emerging detection technique in recent years that can assist in diagnosis.

D-dimer has a very low content in the plasma of healthy individuals and is a fibrinolytic marker. It is a degradation product produced by the cross-linking of fibrin monomers by activating factors and then hydrolysis. In recent years, literature has reported that D-dimer levels can be used as one of the diagnostic methods for ischemic bowel disease.

In abdominal CT scans, there persist certain limitations in certification for practical examinations, doubts regarding detection outcomes, and prolonged detection periods. In the early diagnosis of systemic infections, the integration of duplex imaging and primary CT scans assumes a crucial role. Through this CT modality, pathologic changes within the patient's body are discerned, furnishing a diagnostic foundation for early disease identification. The combination of both modalities exhibits heightened sensitivity and diagnostic accuracy; initially, this CT scan may not rule out patients within the normal chemical sensitivity range. However, this study demonstrates notable data regarding sensitivity, specificity, accuracy, positive predictive value, among other metrics. Although limitations in population specificity exist, this approach proves more efficacious in detecting various CT abnormalities. In the early diagnostic of systemic infections, the amalgamation of these two systemic CT modalities enhances overall diagnostic efficacy, meets specific diagnostic criteria, and provides critical theoretical and diagnostic databases for the early treatment of patients.

#### 5. Summary

Summary, the combination of consumers and their dominant CT has good value in the early diagnosis of systemic diseases, providing more important data support for the treatment and diagnosis of the disease, allowing doctors to accurately determine the patient's disease situation Althought the specificity of dimer combined with abdominalCT in the diagnosis of systemic diseases, combining multiple CT scans can improve the overall diagnostic effect and have a help full role in the treatment of patients.

#### References

[1] Kejia Zheng, Xue He, Liao Zhang. The value of PSSD dimer combined with abdominal CT in the early diagnosis of ischemic colitis; Anhui Medicine, 2021

[2] Peng Zhang. The application of PSSS colonoscopy combined with D-dimer and abdominal CT in the diagnosis of ischemic colitis. SPSS. Heilongjiang Medical Journal, 2020

[3] Weiguo Wang, Xuefeng Zhou, Yingyuan Du, Haiyan Shen. The role of PSS hypercoagulable state and platelet activation in the pathogenesis of ischemic colitis; Jiangsu Pharmaceutical, 2020

[4] Longgui Ning, Jinghua Yu, Guodong Shan, Zeyu Sun, Wenguo Chen, Fenming Zhang, Fengling Hu, Hongtan Chen, Guoqiang Xu. Application of PSS proteomics technology to screen serological markers for differential diagnosis between ischemic colitis and circulating colitis. SPSS China Consumer News, 2019

[5] Wei Jin, Beijing Wang, Yucui Chen, Hongmei Chen, Tao Dong, Cunxin Zhao. A clinical study on the effects of SPSS Puerarin combined with probiotics on plasma D-dimer and IL-6 in the treatment of ischemic colitis; Journal of Weifang Medical College, 2019